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INTERNATIONAL PRELIMINARY EXAMINATION REPORT



(PCT Article 36 and Rule 70)

Applicant's or agent's file reference CMF/42687/PC	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/416)	
International application No. PCT/IT 03/00664	International filing date (day/month/year) 28.10.2003	Priority date (day/month/year) 28.10.2003
International Patent Classification (IPC) or both national classification and IPC B29B7/20, B01F7/08, B29C47/40		
Applicant COLMEC S.P.A.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 7 sheets, including this cover sheet.
- ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).
- These annexes consist of a total of 4 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the opinion
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 22.09.2004	Date of completion of this report 02.02.2006
Name and mailing address of the international preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized Officer Fageot, P Telephone No. +31 70 340-2092 

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. **PCT/IT 03/00664**

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, Pages

2-5	as originally filed
1, 1a	received on 14.12.2005 with letter of 09.12.2005

Claims, Numbers

2-4, 6, 7	as originally filed
1, 5	received on 14.12.2005 with letter of 09.12.2005

Drawings, Sheets

2/3, 3/3	as originally filed
1/3	received on 14.12.2005 with letter of 09.12.2005

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. **PCT/IT 03/00664**

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-7
	No: Claims	
Inventive step (IS)	Yes: Claims	1-7
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-7
	No: Claims	

2. Citations and explanations

see separate sheet

Re Item V

**Reasoned statement with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement**

1. Reference is made to the following documents:
D1: EP-A-0 472 431
D2: US-A-6 129 450
D3: US-A-3 226 097
2. In respect of Article 6 PCT, the following is observed.
 - 2.1 Some of the features in the apparatus claim 1 relate to a method of using the apparatus rather than clearly defining the apparatus in terms of its technical features. The feature "*...said batching chamber also acting as compounding chamber.*" in the apparatus claim 1 relate to a method of using the apparatus rather than clearly defining the apparatus in terms of its technical features. The intended limitations are therefore not clear from this claim, contrary to the requirements of Article 6 PCT.
 - 2.2 The embodiments of the invention described on page 5, last paragraph do not fall within the scope of the claims. This inconsistency between the claims and the description leads to doubt concerning the matter for which protection is sought, thereby rendering the claims unclear, Article 6 PCT.
The applicant is requested to remove the inconsistency by deleting the "excess" subject-matter from the description, cf. the PCT Guidelines, 5.30.
3. The following statements are made under reference to paragraph V.2 of this written opinion.
 - 3.1 Independent claim 1

The document D1 discloses (the references in parentheses applying to this document): a mixing and extrusion machine for rubber-based and silicon-based plastic materials (*col. 1, lines 3-5, fig. 1*) of the type comprising a dump extruder equipped with conical converging twin screws located in a batching chamber (*col. 4, lines 2-12, fig. 1*), said chamber having a low pressure feeding area and a high

pressure ducted area (*col. 4, lines 12-14, fig. 1 and col. 1, lines 28-35, col. 7, lines 52-54*).

The subject-matter of independent claim 1 differs therefrom in that the mixing and extrusion machine further comprises a removable blind flange for temporarily sealing the outlet of said batching chamber so that said material is forced to recirculate between said duct area and said feeding area within said batching chamber, said chamber thereby also acting as a compounding chamber.

The subject-matter of claim 1 is therefore novel (Article 33(2) PCT).

The objective problem underlying claim 1 is to provide an existing dump extruder that combines the mixing and extrusion operations for the preparation of rubber compound or silicone-based material in a single and cost effective apparatus, cf. description, page 1, lines 34-37.

Although a mixer for processing viscous elastic material such as polymer melts or elastomers having a feedback processing channel located outside a batching chamber is known from D1, cf. abstract, col. 1, lines 33-35 and figure, this document does not solve the problem underlying claim 1, for which reason there is no indication for the skilled man to come to the combination of features of claim 1.

Consequently the subject-matter of claim 1 meets the requirements of Article 33(3) PCT.

3.2 Independent claim 5

The document D1 discloses (the references in parentheses applying to this document): a compounding and extrusion method of a semifinished rubber-based or silicon-based plastic product (*col. 1, lines 3-5*), of the type comprising the step of extruding said semifinished product from a dump extruder equipped with two conical converging twin screws housed in a batching chamber (*col. 4, lines 2-12, fig. 1*) comprising a low pressure feeding area and a high pressure duct area (*col. 4, lines 12-14, fig. 1 and col. 1, lines 28-35, col. 7, lines 52-54*).

The subject-matter of independent claim 5 differs therefrom in that the method further comprises the following prior steps:

- applying onto the outlet of the dump extruder a blind flange that closes the outlet,
- feeding the raw material to be compounded into the batching chamber of said conical screws,
- starting the dump extruder to force the material to recirculate between said duct area and said feeding area of the batching chamber, for the time necessary to obtain a compounding of the raw material in said chamber,
- removing said blind flange and continuing operation of the dump extruder up to extrusion of the compound.

The subject-matter of claim 5 is therefore novel (Article 33(2) PCT).

The objective problem underlying claim 5 is to provide a method for mixing and extruding rubber compound or silicone-based material that uses only an existing dump extruder without an operation of mixing in a mixer located upstream of the dump extruder, cf. description, page 1, lines 34-37.

Although a method for processing viscous elastic material such as polymer melts or elastomers using a single mixer having a feedback processing channel located outside a batching chamber is known from D1, cf. abstract, col. 1, lines 33-35 and figure, this document does not solve the problem underlying claim 5, for which reason there is no indication for the skilled man to come to the combination of features of claim 5.

Consequently the subject-matter of claim 5 meets the requirements of Article 33(3) PCT.

4. Dependent claims 2 - 4, 6, 7

Claims 2 - 4, 6, 7 are dependent on claims 1 and 5 and fulfill as a result the requirements of Articles 33(2) and (3) PCT.

5. The subject-matter of claims 1 to 7 is considered as susceptible of industrial application (Article 33(4) PCT).

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/IT 03/00664

- 6. The following is to be noted too.
- 6.1 The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).
- 6.2 Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in document D1 is not mentioned in the description, nor is this document identified therein.

"MACHINE FOR MIXING AND EXTRUDING RUBBER-BASED AND SILICONE-BASED PLASTIC MATERIALS AND METHOD THEREFOR"

*o*oOo*o*

Field of the invention

5 The present invention relates to a machine for the mixing and extrusion of rubber-based and silicone-based plastic materials and the method therefor.

EPO - DG 1

Background of the invention

14.12.2005

10 It is known that, in modern processes for the preparation of rubber compounds, a system is employed consisting of a closed mixer, commonly called "Banbury mixer", paired with a twin-screw extruder called "Dump Extruder" (fig. 5). The system provides that the raw material, typically rubber, or a silicone-based polymer, is mixed with fillers and various additives in a closed
15 Banbury-type (from the name of its inventor) mixer, from which, at regular intervals, an evenly-mixed compound comes out, called "batch", which falls into the feedbox of the dump extruder lying below.

(37)

20 In other words, during operation, the closed mixer delivers at regular intervals batches of compounded material to the dump extruder, which has instead the function of transforming the compound batch so prepared - typically coming out in the shape of a continuous strip or leaf; this is subsequently cooled and sent to the following processing steps.

25 Alternatively to this system, the step of the preparation of the compound to be extruded can be carried out in an open cylinder mixer: however, in order to obtain a good batch, this type of mixer requires an operator to be present at all times handling the material to be compounded by cutting and reintroducing
30 the compound into the mixer where necessary.

The cylinder mixer is a bulky, expensive and non-automatic machine, and exposes the operator to a high level of injury hazard.

35 ~~The object of the present invention is to overcome these disadvantages by supplying a machine that does not need an open cylinder mixer for the preparation of the rubber compound or silicone-based material~~

~~Such object is achieved by means of a machine as described in its essential features in the attached main claim.~~

- 1bis -

US 6129450 discloses a mixer for viscous materials having a processing channel provided with an outlet opening which can be closed. A feedback channel is further provided to circulate material through the processing channel several times.

US 3226097 and US 3314660 disclose mixers for fluid ingredients, with vertical receptacle and a pair of counter-rotating blades.

The object of the present invention is to overcome these disadvantages by supplying a machine that does not need an open cylinder mixer for the preparation of the rubber compound or silicone-based material.

Such object is achieved by means of a machine as described in its essential features in the attached main claim.

14. 12. 2005

AMENDED CLAIMS

(87)

1) A mixing and extrusion machine for rubber-based and silicone-based plastic materials of the type comprising a dump extruder equipped with conical converging twin screws located in a batching chamber, said chamber having a low pressure feeding area and a high pressure ducted area, characterised in that it further comprises a removable blind flange for temporarily sealing the outlet of said batching chamber so that said material is forced to recirculate between said duct area and said feeding area within said batching chamber, said chamber thereby also acting as a compounding chamber.

5) A compounding and extrusion method of a semifinished rubber-based or silicone-based plastic product, of the type comprising the step of extruding said semifinished product from a dump extruder equipped with two conical converging twin screws housed in a batching chamber comprising a low pressure feeding area and a high pressure duct area, characterised in that it further comprises the following prior steps:

- applying onto the outlet of the dump extruder a blind flange that closes the outlet,
- feeding the raw material to be compounded into the batching chamber of said conical screws,
- starting the dump extruder to force the material to recirculate between said duct area and said feeding area of the batching chamber, for the time necessary to obtain a compounding of the raw material in said chamber,
- removing said blind flange and continuing operation of the dump extruder up to extrusion of the compound.

1/3

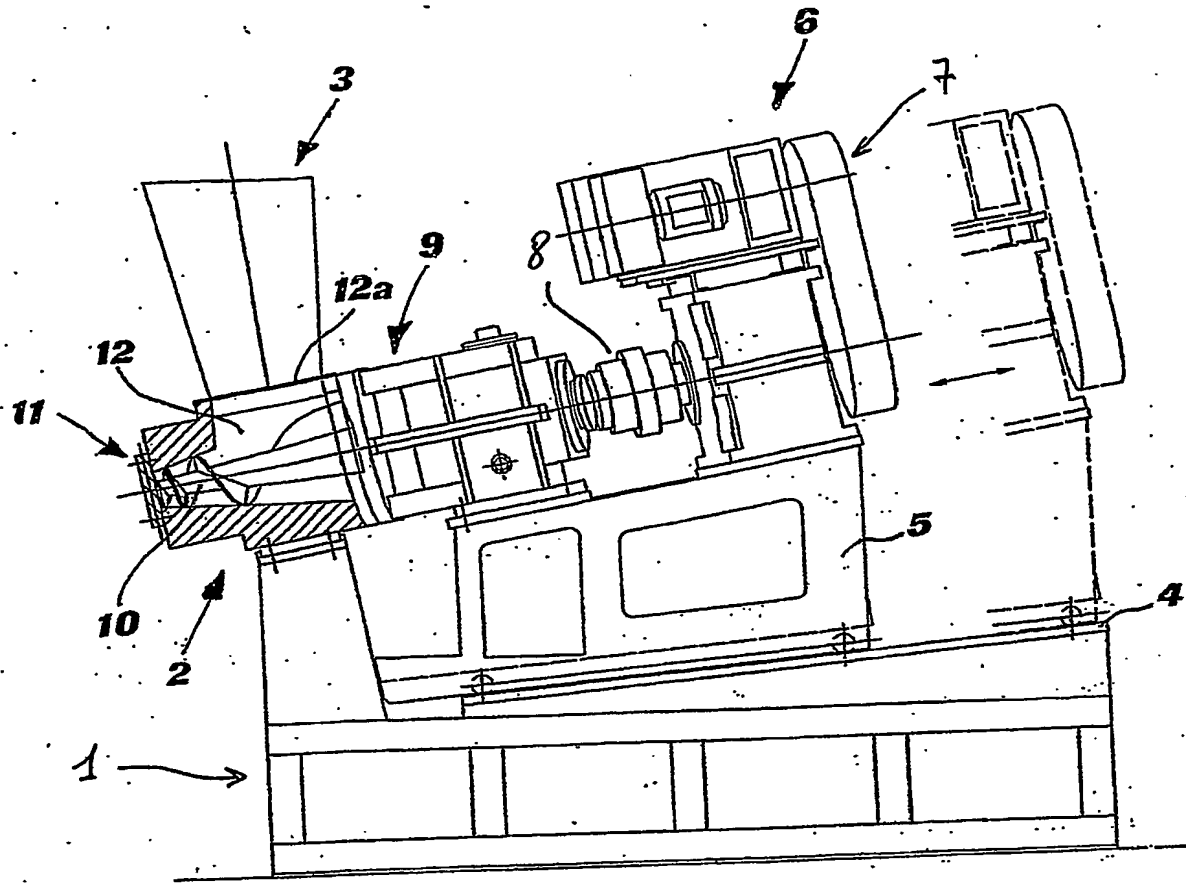


FIG. 1

EPO - DG 1

14. 12. 2005

(87)

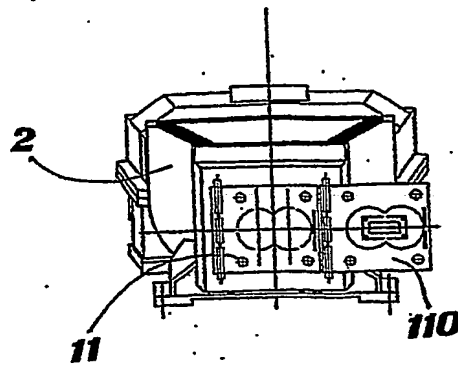


FIG. 2